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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
09/361,980	07/28/99	ITO	PM.262732

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EXAMINER
UMEZ ERONINI, L

ART UNIT	PAPER NUMBER
1765	9

DATE MAILED: 08/27/01

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

Office Action Summary	Application No.	Applicant(s)	
	09/361,980	ITO ET AL.	
	Examiner	Art Unit	
	Lynette T. Umez-Eronini	1765	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on _____.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-32 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-32 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s) _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ | 6) <input type="checkbox"/> Other: _____ |

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DETAILED ACTION

Information Disclosure Statement

1. The information disclosure statement filed July 28, 1999 fails to comply with the provisions of 37 CFR 1.97, 1.98 and MPEP § 609 because no English translation or equivalence was provided for Japanese reference lettered **OR**, **PR**, and **QR**. It has been placed in the application file, but the information referred to therein has not been considered as to the merits. Applicant is advised that the date of any re-submission of any item of information contained in this information disclosure statement or the submission of any missing element(s) will be the date of submission for purposes of determining compliance with the requirements based on the time of filing the statement, including all certification requirements for statements under 37 CFR 1.97(e). See MPEP § 609 ¶ C(1).

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless --

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 5, 6, 10, 26, 27, and 28 are rejected under 35 U.S.C. 102(b) as being anticipated by Ruggiero (US 4,878,770).

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Ruggiero teaches a method of etching a metallic film, comprising steps of:
forming a TiW barrier layer **24** (metallic film) on a thin film resistor (column 3, lines 24, 25, and 60);

forming an Al layer **28** (conductive film) on the TiW barrier layer **24** (metallic film) with a first opening exposing the metallic film thereon (column 3, lines 58-61).

A photoresist (not shown in Figure 5) is laid on the Al layer **28**, a wet-chemical etchant such as "PAN" (phosphoric, acetic and nitric acid) is applied to remove the non-masked portions of aluminum and another wet-etchant such as H_2O_2 removes the corresponding portions of the barrier layer **24** (metallic film), (column 3, lines 61-68). In another embodiment plasma etching (dry etching) is employed to remove, simultaneously layers **22**, **24**, and **28** in the non-masked regions (column 4, lines 39-43), which reads on,

dry etching a second part of the metallic film through the first opening to expose the thin film resistor from the first opening, the second part underlying the first part and directly contacting the thin film resistor. Hence, a metallic layer that can be a metallic film or a barrier layer can be either wet or dry etched and would read on dry and wet etching the metallic film in claims 5, 6, 28, and 31.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

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(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 7, 8, 9, and 11-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ruggiero (US 4,878,770) as applied to claim 5.

Ruggiero differs in failing to specify recited processing parameters such as the thickness of the a first part and a second part of a metallic layer, in **claims 7, 8;**

the thickness of a metallic film, in **claim 11;**

the ratio of the upper surface area of the conductive film relative to an upper surface area of the thin resistor is more than 0.2, in **claim 12;** and

the ratio becomes less than 2.0 for a patterned conductive film that is patterned, in **claim 13.**

It would have been obvious to modify Ruggiero by employing a variety of processing variables such as the thickness and the ratio of the upper surface areas of a metallic layer and the ratio of the upper surface areas of a conductive film during patterning of the film. These variables are known in the etching art to affect the rate and quality and of the etching process. The selection of a particular value would be optimized by conducting routine experimentation for the purpose of obtaining the best etched product.

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Claim Rejections - 35 USC § 103

6. Claim 19 and 20-25, 29, and 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over by Nagahata (JP 63062746A, English Abstract) as applied to claim 19, in view of Iida (JP 03012960A, English Abstract).

Nagahata teaches a method of etching a metallic film, comprising the steps of:

forming a glaze layer 2 (an insulation layer) on the surface of and a resistor layer 3 (thin film resistor) on an insulating substrate 1 (semiconductor). Figure 1a shows a glaze layer (insulation layer) is interposed between the resistor and the semiconductor substrate.

forming aluminum conductor (metallic film) layers 5 and 6 on the glaze layer in a laminated state by oxidizing layer 5 to form the oxide film layer 7 which lies between layers 5 and 6, reads on

forming a metallic film on the thin film resistor; and

oxidizing a surface portion of the metallic film to form a surface oxide layer on the metallic film.

A photoresist method is adapted to the conductor layer 6 to form lead conductors 6a and 6b, in an etching tank. Figures 1b and 1c show that the oxide film layer 7 and the conductor layer 5 (metallic film) are etched which reads,

patterning the conductive film to form an opening in the conductive film, the opening exposing the surface oxide layer therefrom; and

on wet-etching the surface oxide layer and the metallic film.

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Nagahata differs in failing to teach the conductive film is made of a different metallic material than the metallic film, **in claim 19**.

It is well known in the art that conductive films are made of materials such as Al, Cu; and refractory metals.

It would have been obvious to one having ordinary skill in the art at the time of the claimed invention to use conventional metals such as Al, Cu, and refractory metals to make conductive and metallic film materials that are different for the purpose of obtaining the best thin film resistor.

Nagahata differs in failing to teach preparing different first and second metallic films and exposing them by contacting with a specific solution, such that a difference in electrode potential lies therebetween, **in claim 22**.

Iida teaches laminating a CrSi thin film resistor **24**, a TiW film **25** and an aluminum wiring layer **27** on a silicon oxide film **23** which reads on preparing the first and second metallic films laminated with each other, wherein the metallic films differ.

It would have been obvious to one having ordinary skill in the art at the time of the claimed invention to modify Nagahata by laminating different metallic films as taught by Iida for the purpose of obtaining the best electrode and that different metallic films would have different electromotive activities that enable an electric current to flow in the presence of an electrolyte for the purpose of obtaining the best electrode.

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Nagahata differs in failing to teach the conductive film serves as an etching mask, in claim 29.

It would have been obvious to one having ordinary skill in the art at the time of the claimed invention to use a conventional mask material such as a metal which makes up a conductive film for the purpose of obtaining the best etched product.

Allowable Subject Matter

7. Claims 1-4 are allowed.
8. The following is an examiner's statement of reasons for allowance: Prior art lacks a method of forming a mask on a conductive layer wherein the mask has a second opening that is smaller than the first opening and the mask opens in the first opening to expose an underlying metallic film, and etching a metallic film through the second opening.

Conclusion

9. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until


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after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lynette T. Umez-Eronini whose telephone number is (703) 306-9074.

ltue

August 27, 2001


ROBERT KUNEMUND
PRIMARY EXAMINER